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ABSTRACT

In this paper, the author's primary focus is on a marketing information system and its potential importance for adult educators. The content is in seven sections. The first two sections briefly introduce information systems in general and their relevance for adult educators. The third section briefly describes general management information systems; the Massachusetts adult basic education information system is provided as an illustration. The next two sections briefly highlight two systems, research or resource information systems and occupational information systems. The ERIC Clearinghouse on Career Education and the ADELL (Adult Education and Lifelong Learning) Clearinghouse are provided as examples for the first system and the Massachusetts Occupational Information System is used to illustrate the latter system. The sixth section describes the marketing information system, outlines key questions for determining the marketing information needs of managers, discusses five functional components of the system (information sources, collection, process, reporting, and information uses), and identifies the dimensions along which the system might be evaluated. The final section discusses the functional components of a marketing information system for continuing education and summarizes some of the benefits anticipated for a continuing education program through the use of the system. (EM)

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INFORMATION SYSTEMS: AN INTRODUCTION FOR ADULT EDUCATORS

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

by

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Presented At

NATIONAL ADULT EDUCATION ASSOCIATION MEETING

Detroit, Michigan

October 31, 1977

AN INTRODUCTION TO INFORMATION SYSTEMS
for
ADULT EDUCATORS

It is not the intention of the author to suggest that adult educators should become information systems managers or computer technicians, but that adult educators should consider the use of system theory and computer technology in program management. It is difficult to compare the information requirements of different continuing educators, their diverse methods of program development and pricing, and their unique management styles. However, continuing education programs face several common problems, including:

1. increasingly greater reporting requirements;
2. growing requirements for program quality and accountability; and
3. strong competition.

This paper will provide a brief, general introduction to information systems in general and their relevance to continuing educators. Information systems currently available will be highlighted. Key points and questions regarding consideration of information systems will be raised. One state, Massachusetts, has implemented a management information system for Adult Basic Education student and financial record-keeping.[1] Additionally, adult educators currently have available the ERIC system, a computerized research and retrieval system. Clearinghouse ADELL currently in development will enhance the research capabilities of adult educators. Occupational information retrieval systems are currently functioning in several states.[2]

The primary focus of this paper, however, will be on marketing information systems and their potential importance for continuing educators.

INFORMATION SYSTEMS THEORY

Information systems theory and the frequent use of the word "system" in recent years has developed as a more unified and sophisticated means of collecting and analyzing information. Webster defines system as, "...an organized or complex whole; an assemblage or combination of things or parts forming a complex or unitary whole." Information systems handle quantities of data and provide for complex interrelationships between subsets of this data, all of which enables a manager to plan, organize and control.

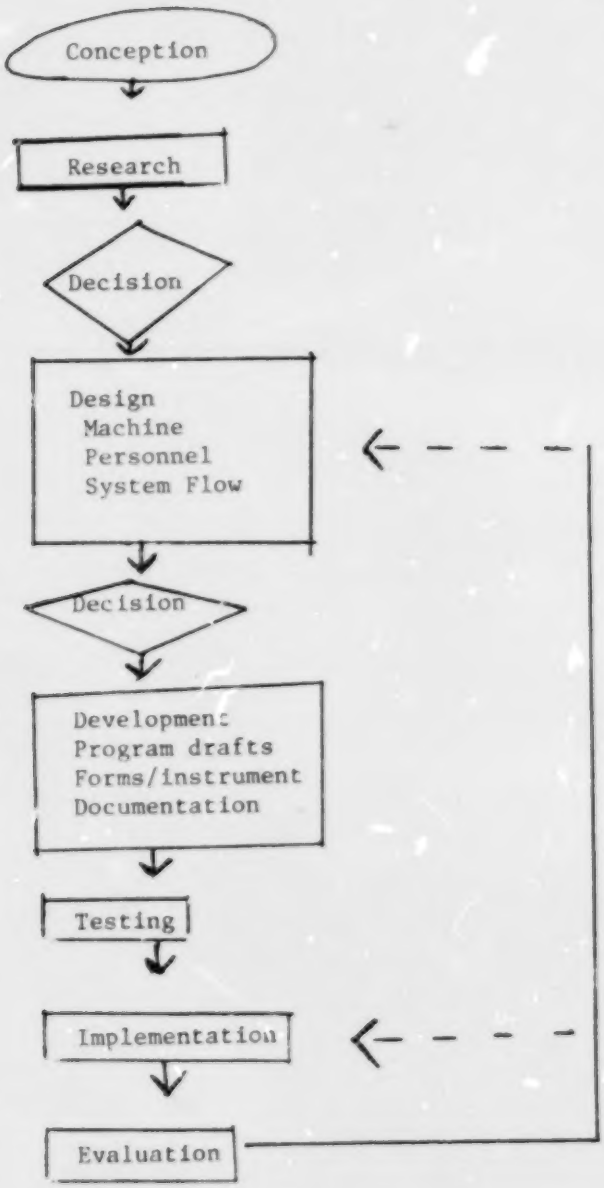
Information systems have emerged with the increasing advent of computer technology. However, the dependence of the first on the second has perhaps been far too emphasized. Withington described the relationship between information systems and computer technology in the following:

> The study of information systems...is not the study of computers. It is the study of how the organization communicates and processes information to maximize the effectiveness of management and further the objectives of the organization. In fact, however, most organizations never devoted great attention to their information systems until they began to consider the use of computers. The flexibility and power of the new tool, as well as its great cost, have caused managers to think for the first time of formally planning their information flows and processing functions.[3]

Whether one is discussing management information systems, resource and research retrieval systems, occupational information systems or marketing information systems, all have several common elements. Most systems were developed, implemented and evaluated according to the following flowchart sequence.

FIGURE 1

Information System Flowchart



MANAGEMENT INFORMATION SYSTEMS

Several introductory overviews of management information systems including those by Bocchino[4], Head[5], and Ross[6], have offered the following definition: a management information system develops in response to management needs for "accurate, timely, and meaningful data in order to plan, analyze, and control the organization's activities and thereby optimize its survival and growth." Management information systems achieve these ends by "providing the means for input, processing and output of data plus a feedback decision network that helps management respond to current and future changes in the internal and external environment of the organization."

Management information systems have three general objectives: to provide timely information to management, to assist managers in the allocation of resources, and to aid managers in the selection of alternatives.

Regardless of form or application, several general characteristics which describe all management information systems may be noted as follows:

1. Management Information Systems should provide data for executive decision making.

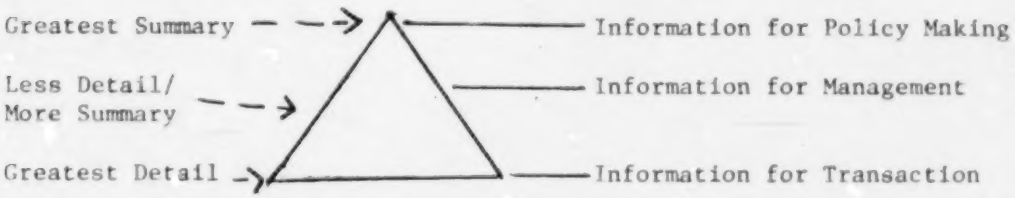
2. Any system should have the capacity to provide data to managers at various functioning levels within the organization.

3. Information systems must be capable of responding to both structured and unstructured requests for information.

4. An information system should provide integrated and nonredundant information.

It is crucial to the functioning success of any management information system to identify the differing information needs of individuals at various levels within the organization. An information system must capcure data of sufficient detail to respond to these varying needs. This has been best illustrated by a pyramid showing that the need for detail is

greatest by these at the bottom levels of the organization and that refinement and summarization of the data becomes increasingly crucial to those at the middle and upper points of the pyramid.



The Massachusetts Adult Basic Education information system illustrates a management information system capable of supporting management use on three levels - federal, state and local. Currently, this computerized information system provides a cost-effective approach to managing data on:

1. all adult students enrolled at Adult Basic Education programs throughout the state, and

2. all financial information on the state ABE grant and local matching funds.

The student data base consists of pertinent demographic information on enrolled students such as age, sex, race, income source, initial placement level, referral source, goals and objectives for participating, and, when appropriate reason for separation, level at separation, personal and academic success resulting from the program. Monthly, managers of 30 different learning sites throughout the state receive reports on their participants identifying student participation patterns detailed by level, by age, by sex, by time of day, by referral group. Cumulative participation hours and average hours are calculated. Counselors at each site are given reports which detail students who have been missing for the entire month or who have attended less than 15 hours.

The State Bureau of Adult Services receives a monthly report summarizing participation activity at each site. Quarterly program impact and success activities are detailed for each program manager and the state supervisors. Annually, a standardized report required by the Office of Education is compiled based on all state data.

The financial data base consists of budget and expenditure information on each of the 30 different learning sites throughout the state. Monthly, information on current expenditures is processed. Thus, the State Bureau of Adult Services receives a monthly report summarizing expenditures for each site. Quarterly, cost benefit analysis such as cost per student, a cost per instructional hour, cost per student completion can be accomplished by having an interaction between the student data base and the financial data base. This management information system is used for both control of the programs and planning for maximally efficient use of financial and programmatic resources.

RESEARCH OR RESOURCE INFORMATION SYSTEM?

Cognizant of the educator information needs for newly created knowledge, improved instructional practice and materials, research, recent innovations in the field, the National Institute of Education has funded the Education Research Information Clearinghouses as a prime dissemination vehicle. The information needs of adult educators are currently being met by the ERIC Clearinghouse at Ohio State University.

Soon, the ADELL Clearinghouse will join ERIC in responding to those requests. Currently, ERIC which is 12 years old has a 300,000 item data base and is primarily an information retrieval system.

Roger DeCrow outlined

> the shared needs forming the core of knowledge and common interest underlying the emerging Adult Education profession including needs relating to:
>
> - the characteristics of adults as learners
> - the processes of program planning and evaluation
> - the teaching methods, devices, and materials suited to adults
> - the organization, finance, and development of adult education.[7]

DeCrow outlined the major goals of the Syracuse Adult Education Clearinghouse. Currently, these goals are being continued by the ERIC Clearinghouse at Ohio State University:

> Nonetheless, our central focus has been on planning for greatly improved use of the literature of the field through the development of services to help adult educators find out what has been written on their subjects of interest, to help them obtain the documents themselves and to provide other specialized information services.[8]

The other specialized information services provided by the ERIC Clearinghouse include: comprehensive or selective bibliographies on particular subjects, evaluative reviews of the literature by subject, and comprehensive state of the art reviews.

ADELL, which has its origin in 309 funds of the 1974 Adult Education legislation, will be a clearinghouse designed to identify for adult educators research in progress, exemplary materials, programs and products, pertinent organizations, and gaps for future research. Clearinghouse services complimentary to those provided by the ERIC system will be performed by ADELL.

OCCUPATIONAL INFORMATION SYSTEMS

The proliferation of occupational and career information in recent years has become increasingly apparent. Counselors and adults continually seek occupational information which is relevant, accessible, and current. Adult educators constantly seek to establish a linkage between educational programs and career guidance and placement.

Early in 1976 the U.S. Department of Labor established grants to eight states including Alabama, Colorado, Massachusetts, Michigan, Minnesota, Ohio, Washington, and Wisconsin to provide "Current, accurate, and locally relevant" occupational information to persons who are in the process of career exploration and decision-making.[9]

The Massachusetts Occupational Information System has been operational for the last year and has already provided career information in secondary school, community college, prison, and adult education settings. Three major goals have been identified by MOIS:

1. to implement a statewide system for the effective dissemination of information capable of being used by a wide variety of persons;

2. to develop an information base reflecting as realistically as possible the occupational structure and educational/training resources of the state as a whole and its local areas;

3. to create an organizational structure responsive to user needs and the expertise of major information procedures.

Through use of on-line computer terminals, a user can interrogate the data base for information related to his/her particular interests, aptitudes, educational level, physical limitations, and geographic preferences. The information stored includes general career guidance information, occupational outlooks specific to Massachusetts or particular regions, educational opportunities within the state.

MARKETING INFORMATION SYSTEMS

Marketing information systems rely on internal information gathered from within the organization integrated with external information gathered from the marketing environment within which the organization operates. Briem and Stafford have defined marketing information system as:

> A structural, interacting complex of persons, machines and procedures designed to generate an orderly flow of pertinent information collected from both intra- and extra- firm sources, for use as the bases for decision making in specified responsibility areas of marketing management.[10]

Two components are crucial for a marketing information system. These are support and operating components:

> Support systems include those activities required to generate and manipulate data- i.e., market research and other data gathering, programming and data processing. Operating systems are those that use data as an aid to planning and controlling marketing activities.[11]

Repeatedly, research has shown that the critical factor necessary for the successful development and implementation of any information system is the support of management. Kotler has outlined the key questions for determining the marketing information needs of managers. These include:

1. what types of decisions are you regularly called upon to make?
2. what types of information do you need to make these decisions?
3. what types of information do you regularly get?
4. what types of special studies do you periodically request?
5. what types of information would you like to get that you are not now getting?
6. what information would you want daily? weekly? monthly? yearly?[12]

A total marketing information system must include several functional components. These are shown in Figure 2. Data collected (2.0) comes from two main sources - the macroenvironment (1.1) which would include: societal trends; occupational outlook forecasts; economic forecasts, to name but a few, and the microenvironment (1.2) which would include: information on the more immediate environment within which the organization operates. Collection of data from these two sources would be gathered as either marketing research data (2.1) or internal records (2.2).

The processing of the information (3.0) would optimally include computer application, but the storage, retrieval and analysis of data (3.1) may certainly be accomplished manually. A modelling capability (3.2) almost always involves the use of a computer to set up alternative strategies of data manipulation. Models significantly enhance decision making. The purpose of a model is to analyze the relationships among variables and assist the manager in looking at alternative responses. Marketing models and their value are subjects of some discussion and controversy. These have ranged from new product models to advertising models to predictive and simulation models. The successful outcome of any model design rests squarely on the creative development and identification of variables exercised by users.

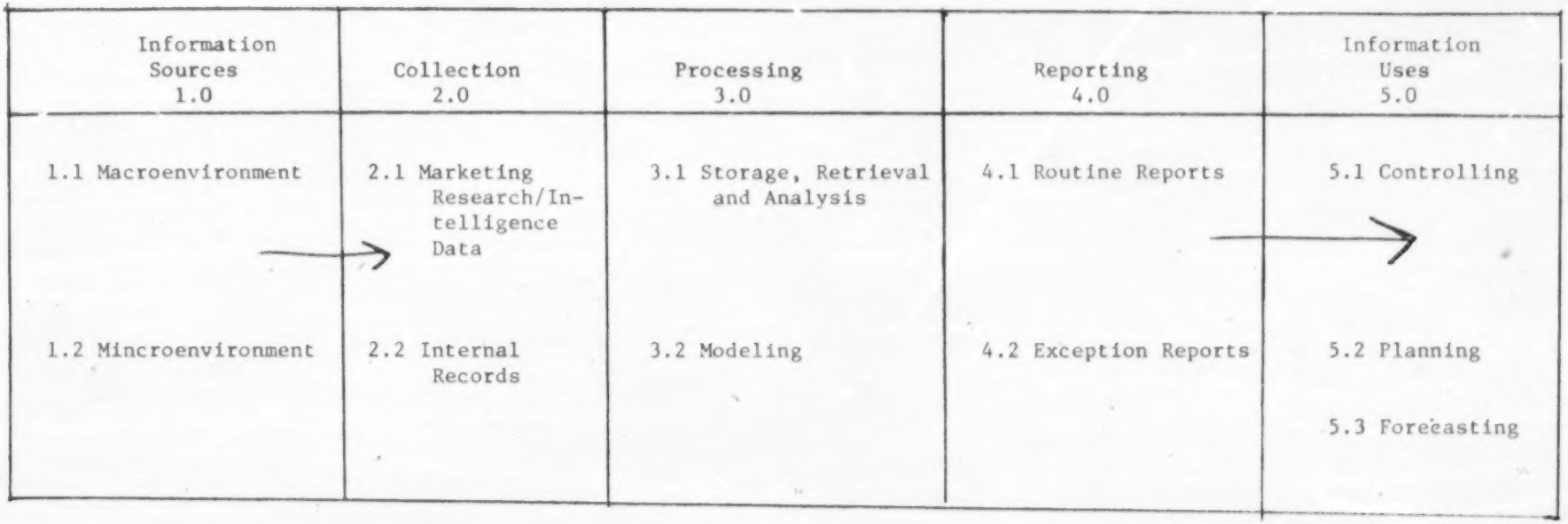
Data gathered as marketing research (2.1) or as internal records (2.2) once analyzed can be reported out as Routine Reports (4.1) or Exception Reports (4.2). Routine Reports (4.1) are constructed based on the information needs identified by management. Exception Reports (4.2) serve the valuable function of alerting managers to significant (positive or negative) deviations from the organizations normal operations Management uses these reports for controlling (5.1) operation of the organization, for planning (5.2) alternatives for the organization and for forecasting (5.3) possible new directions for the organization.

Figure 2

Functional Components

of a

Marketing Information System



The development of marketing information systems has not been an easy one. Progress toward sytsems which do more than store information in a data bank and display it has been slow. Lacking "measurement and statistical capability" coupled with "models to digest the data being generated," Montgomery notes that the marketing information system will be "unbalanced," and "will be capable of only limited decision relevance."[13]

To date, marketing information systems have promised more than they could deliver for several reasons:

1. systems designed by information system specialists have been theoretical masterpieces but disasters as practical management tools. The potential communication gap between the specialist who implements a system and the manager for whom it is designed is well-documented.

2. marketing systems have not been given priority within an organization. Accounting and inventory control are traditionally given precendence.

Several investigators have examined the marketing information systems currently in operation. Amstutz has investigated marketing information systems: "1. to determine the current state of market oriented management information system development and utilization, 2. to identify relevant characteristics of successfully implemented systems and 3. to evaluate the impact of representative systems on the management they were designed to serve."[14] Anstutz used five dimensions along which marketing information systems might be evaluated, including:

1. Management access - the retrieval time for information.

2. Information recency - the lapse of time between the occurrence of an event and the inclusion of data describing the event in the system.

3. Information aggregation - the detail with which information is maintained in the system data files.

4. Analytic sophistication - the sophistication of models employed in the system. This dimension may range from retrieval and display to arithmetic operations to logical analysis to future forecasting.

5. System authority - the amount of authority for decision making which management may delegate to the system. This is closely associated with analytic sophistication.[15]

After surveying the 500 largest U.S. industrial corporations compiled by Fortune Magazine, Amstutz concluded that there were "dramatic differences between the theoretical capabilities of management systems described in the literature and those actually used or planned by operating companies." Most companies had systems no more sophisticated than collecting and retrieving data. He also found that more sophisticated applications had evolved over time in companies where management and systems specialists had learned to communicate and focus on broader information requirements. The greater the familiarity with the system the greater was management's willingness to give it more decision making authority.

A MARKETING INFORMATION SYSTEM FOR CONTINUING EDUCATION

Increasingly, nonprofit organizations are recognizing the crucial importance of marketing. Continuing education programs are no exception. These programs which have been the stepchildren of regular divisions in colleges and universities added for the sole purpose of contributing revenues to the host institution are particularly concerned about marketing. Often these programs operate as independent cost centers and must demonstrate both cost-effectiveness and high quality courses.

Increasingly those programs are competing both for new "product lines" or educational programs and for new "markets" or students. Self-supporting continuing education programs have needs not unlike corporations for forecasting potential new courses which are financially feasible. Rathmell notes that "service, like goods, have life cycles. Undoubtedly, there are fads and fashionableness of service."[16] The discussion of marketing information systems which follows is designed with self-supporting continuing education programs in mind.

A marketing information system would substantially enhance the continuing educators' facility in program development, sales forecasting, and optimizing growth. Kotler notes:

> The crucial administrative steps of marketing planning and control cannot be carried out effectively unless the organization has developed an adequate and reliable base of marketing information...These and other nonprofit organizations need major amounts of information to plan their marketing activities. They need timely, accurate information as a basis for determining target markets and effective marketing mixes.[17]

Continuing educators have always been aware of the critical need for relevant information from diverse sources for purposes of program planning. The nature and organization of this information flow is more or less systematized, depending upon the program itself and the managers.

Quite frequently the information processed by program managers in program planning includes:

1. previous courses offered by the program;
2. what the competition or other programs are doing;
3. demographic information on the intended audience, such as age, sex, income level, educational background;
4. demographic information on previous program participants;
5. occupational outlook;
6. current societal trends.

Peter and Boshier in considering program development in continuing education have summarized the following information sources:

> A useful starting point can be found by considering the motives, needs, interests, and expectations of potential clients; prevailing social forces; community characteristics; and the organization's purpose, philosophy, and structure.[18]

The functional components of a marketing information system for continuing education would be the same as for any other information system, as shown in Figure 2. A determination of what information should be gathered from the macroenvironment and microenvironment to form the marketing research or intelligence data must be made. The information from the macroenvironment should include:

1. demographic information on the potential pool of participants in the program drawn from the census and other numerous information sources;
2. occupational outlook information, drawn from the U.S. Department of Labor, as well as occupational outlook information specific to the program's geographic area;

3. information drawn from the help wanted ads in the newspaper to target the current growth employment areas;

4. needs assessment or marketing survey questionnaires of professional business associations, professionals in the field to provide information on the particular training needs and requirements;

5. brochures and program descriptions from other programs to provide information on what other continuing education programs, i.e. the competition, is doing.

6. marketing surveys of potential participants in the continuing education program.

The internal record system of a continuing education program provides vital information on a specific subset of the microenvironment, the populations the program has already served and on how the program served this group. The information would include:

1. program information - courses which were held, possibly courses which did not have sufficient enrollment to be held.

2. student information - pertinent demographics on all students, courses in which the student is enrolled.

3. financial information - information pertaining to income and expenses of the continuing education program stored by relevant line items.

Returning for a moment to Amstutz's evaluation of marketing information systems, it is crucial that the programs internal records be compiled in a disaggregate form; that is, information by course and by student, so that the greatest possible data analysis and manipulation is feasible.

In relation to Amstutz's dimensions of system authority and analytic sophistication, a marketing information system would have both a retrieval and display capability as well as calculation and analytic capabilities.

Reporting requirements for any marketing information system are best determined by the particular manager who will use the system, but listed below are several possibilities:

1. reporting by course identifying the number of registrations, the tuition income, the expenditures.

2. reporting by student profile identifying the number of students by city, age, sex, income level, course type, company or business.

3. reporting financial statements, identifying profitability by course, by program, by advertising medium.

Exception reporting or the monitoring of marketing activities would be included. It would indeed be useful to have the manager flagged by an exception report which indentifies: a course which has insufficient enrollment; courses which semester after semester continue underenrollment; expenditure which are in excess of income, students who have attended only one course never to return again. One should note that exception reporting can be just as valuable in alerting managers to situations exactly the reverse of those just mentioned.

Cox and Good after examining some of the results and capabilities of marketing information systems have suggested that these can be categorized by: 1. Control systems which "provide continuous monitoring (sometimes through exception reporting) and rapid spotting of trends, problems and marketing opportunities. They allow better anticipation of problems, more detailed and comprehensive review of performance against plans and greater speed of response." 2. Planning systems which provide information the manager requires for planning marketing and sales programs. 3. Basic Research systems which can test alternative decisions and cause-and-effect hypotheses.[19]

Based on Cox and Good's classification, the following chart summarizes briefly some of the benefits anticipated for a continuing education program through the use of a marketing information system:

Benefits Anticipated From a MIS

or

Information Uses Anticipated From a MIS

CONTROL

1. greater control over expenditures through more timely and improved reports.

2. diagnosis of poor response to particular courses and programs is more readily possible and particular variables may be examined for the reasons contributing to this poor response.

PLANNING

1. improved program planning and marketing segmentation through use of timely and accurate reports.

2. long-range planning for promotional efforts and budgeting. Additionally, changes in promotional or pricing strategy may be readily measured against sales.

FORECASTING/RESEARCH

1. pricing strategies may be improved using simulation and alternative future models.

2. Program planning may be enhanced by suggesting new directions based on information coming from both the macroenvironment and the internal records system.

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FOOTNOTES

1. Caldwell, Phyllis. "Massachusetts Adult Basic Education Management Information System, Working Paper No. 1", November, 1976.

2. Caldwell, Phyllis. "Introduction to Information Systems", a paper presented at the New England Regional Adult Education Conference, Hartford: May, 1977.

3. Withington, F. G. The Use of Computers in Business Organizations. Reading, MA: Addison-Wesley, Inc., 1966, p3.

4. Bocchino, William. Management Information Systems. Englewood Cliffs: Prentice Hall, 1972.

5. Head, Robert. Manager's Guide to Management Information Systems. Englewood Cliffs: Prentice Hall, 1972.

6. Bower, James and Welke, William, editors. Financial Information Systems. Boston: Houghton Mifflin, 1968.

7. DeCrow, Roger. A Model Information System for the Adult Education Profession. Chicago: Presentation to the National Seminar on Adult Education Research, 1968.

8. DeCrow, Roger, Ironside, Diana, and Miller, Ronald. Adult Education Information Services: Establishment of a Prototype System for a National Adult Education Library. Syracuse: Library of Continuing Education of Syracuse University, 1967.

9. U.S. Department of Labor. Occupational Information Systems Grants Program: State Project Summaries. Washington, D.C. National Occupational Information Service, 1976.

10. Brien, R., Stafford, J. "Marketing Information Systems: A New Dimension for Marketing Research", in C. Schewe, Editor, Marketing Information Systems. Selected readings, American Marketing Association, 1976, p4.

11. Cox, D., Good, R. "How to Build a Marketing Information System", in C. Schewe, op. cit., p38.

12. Kotler, P. Marketing For Nonprofit Organizations. Englewood Cliffs: Prentice Hall, 1975, p257.

13. Montgomery, D. "The Outlook For MIS", in C. Schewe, op. cit., p177.

14. Amstutz, A. "The Marketing Executive and Management Information Systems", in C. Schewe, op cit., p31.

15. Amstutz, A. "Market-Oriented Management Systems: The Current Status", in C. Schewe, op. cit., pp. 155-170.

16. Rathmell, J. Marketing in the Service Sector. Cambridge: Winthrop Publishers, 1974.

17. Kotler, P. Marketing For Nonprofit Organizations. Englewood Cliffs: Prentice Hall, 1975, p254.

18. Peters, J., Boshier, R. "Adult Needs, Interests and Motives", in C. Klevins, Editor, Materials and Methods in Continuing Education. Los Angeles: Klevens Publications, 1976, p211.

19. Cox, D., Good, R. "How to Build a Marketing Information Systems", in C. Schewe, op. cit., p40.